Lottia persona Responses to Light

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Introduction

The mask limpet, *Lottia persona*, is well-known for the ability to sense light through translucent spots near the apex of the shell. According to David R. Lindberg et al, *Lottia persona* (formerly *Notoacmea persona* and *Tectura persona*) is negatively phototropic and is most active at night (1975). This experiment was set up to test how *Lottia persona* reacts when light is directly shined on the translucent spots of the shell. I hypothesized that *Lottia persona* would be more active in the presence of light, and that given the choice between water and shade, they would try to move to the shade. The last part of this hypothesis is based off of the distribution of *L. persona*, which is the high intertidal zone (Lamb 2005).

Materials and Methods

The 12 *Lottia persona* used in this project were collected from Middle Cove, Cape Arago, and remained in the laboratory for approximately one week before becoming subjects in the experiment. Three groups of four individuals were formed. Each member of one group was numbered with dots using the same paint pen color (red, blue, or green). The experimental environment was set-up in a large wooden square frame which was placed in a black water table. A 31 cm x 35 cm plate of plexiglass was placed in the center of the frame and was positioned to lean against a large rock. The large rock was meant to serve as a shaded area, and a small portion of the bottom of the plexiglass was submerged in seawater. As a control, a group of limpets was placed in the center of the glass (midway between both the water and the rock) and the entire apparatus was covered with black foam board. After 40 minutes, observations were made, and a light source was added. The light was positioned to shine

directly on the anterior end of the limpets (all facing the light source). The apparatus was then covered so as to eliminate outside light sources. After another 40 minutes, the limpets were observed. Each group had one control trial and three manipulated trials. Between trials, the plexiglass was wiped with a paper towel in order to wipe away slime trails.

Results

Each group of four limpets had only one control trial. The limpets exhibited about six different responses, which are reflected in Table 1. The responses are grouped into two categories: rotation in place and travel direction. In the dark, eight rotated in place while 4 traveled from the spot on which they were placed.

Table 1: Total Number of Limpets per Reaction, Control

Rotation				Travel	
No Movement	**Anterior Down**	**Anterior Up**	**180° Turn**	**To Water**	**To Rock**
1	2	3	2	2	2

Each group also experienced three manipulated trials. The responses were deduced into nine groups, which again were part of the two categories of either rotation or travel. Table 2 shows the number of responses. There were 19 total rotations to 17 possible movements. The "other" group is considered movement because the limpets were found on the underside of the glass, but it is unclear as to which direction they may have headed in order to get there.

Table 2: Manipulated Results

Rotation				Travel				
No Movement	**Anterior Down**	**Anterior Up**	**180° Turn**	**To Water**	**To Rock**	**Submerged**	**On Rock**	**Other**
3	5	5	6	5	5	3	2	2

Discussion

Since there were so few limpets used, it did not seem logical to average the responses in order to calculate a percentage. According to the data, the hypothesis is not supported. In the control and manipulated trials, more limpets rotated than traveled. Since the limpets moved in the dark as well as in the light, it may not be possible (given the limited number of trials) to tell whether the light caused the limpets to be more active. Perhaps taking measurements of distance traveled, and monitoring travel in shorter time intervals could have helped. Overall, the experiment was interesting and there was definitely some movement in most of the limpets, even if the movement was just a rotation.

For future research, it would be necessary to use more limpets and manipulate the surface they were on to see if the angle affects movement. Also, using more natural substrate and testing limpets in the field could help to get more conclusive results.

Works Cited

Lamb, Andy and Hanby, Bernard. 2005. Marine Life of the Pacific Northwest. Harbour Pub., Madeira Park, B.C. p 212.

Lindberg, David R. et al. 1975. Evidence of Light Reception Through the Shell of *Notoacmea persona* (Rathke, 1833). The Veliger. 17(4): 383-386.